



## Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact [support@jstor.org](mailto:support@jstor.org).

the author's meaning, and is due to an apparent failure on the part of Professor Fiske to realize that the question is not what must be in order that  $d(dx)$  may be 0, but what is in order that  $\frac{d}{dx}(dx)$  may be 0.

## DEPARTMENTS.

### SOLUTIONS OF PROBLEMS.

#### ARITHMETIC.

96. Proposed by **RAYMOND SMITH**, Tiffin, Ohio.

How many acres in a square field whose diagonal is 10 rods longer than the side?

**I. Solution by J. F. TRAVIS**, Student at Ohio State University, Columbus, O.; **EDWARD R. ROBBINS**, Master of Mathematics, Lawrenceville School, Lawrenceville, N. J.; **J. SCHEFFER**, A. M., Hagerstown, Md.; **F. R. HONEY**, Ph. B., New Haven, Conn.; **M. E. GRABER**, Mt. Eaton, O.; **WALTER HUGH DRANE**, Professor of Mathematics, Jefferson College, Washington, Miss.; and **JOSIAH H. DRUMMOND**, LL. D., Portland, Me.

Let  $ABCD$  be the square field, and  $AC$  its diagonal. On  $AC$  lay off  $CF$  equal to  $BC$ . At  $F$  erect  $FE$  perpendicular to  $AC$  and intersecting  $AB$  in  $E$ . Draw  $EC$ . Then in the right triangles  $CFE$  and  $CBE$ ,  $CB$  equals  $CF$ , by construction and  $CE$  is common. Hence,  $FE$  equals  $EB$ . In the right triangle  $AFE$ , the angle  $FAE$  is equal to  $45^\circ$ . Hence, the angle  $FEA$  equals  $45^\circ$ . Hence the side  $AF$  equals the side  $FE$ . Then

$$\begin{aligned} AB &= (AE + EB) = [\sqrt{AF^2 + FE^2} + EB] \\ &= [\sqrt{2EF^2} + EB] = (EF\sqrt{2} + EB) = (\sqrt{2} + 1)EB. \end{aligned}$$

But  $EB = AF = 10$  chains.  $\therefore AB = 10(\sqrt{2} + 1)$ , and area of the field  $= AB^2 = 100(\sqrt{2} + 1)^2 = 100(3 + 2\sqrt{2}) = 582.8427$  square rods, or 3.642 acres.

**II. Solution by M. A. GRUBER**, A. M., War Department, Washington, D. C.; **G. B. M. ZERR**, A. M., Ph. D., Professor of Mathematics, Chester High School, Chester, Pa.; and **P. S. BERG**, Superintendent of Schools, Laramore, N. D.

We will solve generally by making  $a$  the excess of the diagonal over the side.

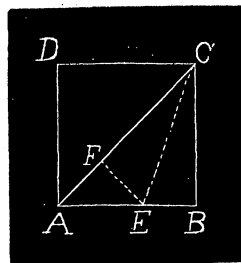
Let  $x$  = side of square field. Then  $2x^2 = (x + a)^2$ .

Solving this equation for  $x$ , gives,  $x = a(1 \pm \sqrt{2})$ .

$\therefore \text{area} = x^2 = a^2(3 \pm 2\sqrt{2})$ .

Now substituting 10 for  $a$ , and we obtain

$$\begin{aligned} \text{Area} &= 100(3 \pm 2\sqrt{2}) = 582.8427 + \text{square rods, or } 17.157 + \text{square rods,} \\ &= 3.6429 + \text{acres,} \qquad \qquad \qquad \text{or } .10723 + \text{acres.} \end{aligned}$$



[QUERY. How interpret the second result? M. A. G.]

[NOTE.—The answer to this query is simply this: The second result is not geometrically interpretable, for the reason that the negative value of  $x$  from which it is derived, is not geometrically interpretable. The negative value of  $x$  satisfies the algebraic condition expressed by the equation and that alone. Ed. F.]

III. Solution by J. K. ELLWOOD, A. M., Principal of Colfax School, Pittsburg, Pa.; COOPER D. SCHMIDT, A. M., Professor of Mathematics, University of Tennessee, Knoxville, Tenn.; and CHARLES C. CROSS, Libertytown, Md.

The diagonal of a square = the side  $\times \sqrt{2}$ .

$\therefore$  side  $\times \sqrt{2}$  = side + 10 rods, or side  $(\sqrt{2} - 1)$  = 10 rods, and side =  $10 \div (\sqrt{2} - 1)$ .

Hence  $[10/(\sqrt{2} - 1)]^2 \div 160 = 3.64 +$ , the number of acres.

97. Proposed by J. A. CALDERHEAD, M. Sc., Professor of Mathematics, Curry University, Pittsburg, Pa.

In what time will \$4000 amount to \$5134.96, interest at 6% payable annually?

Solution by WILLIAM W. CHAMPLAIN, Wickford, R. I.

The time is evidently between 4 and 5 years.

The interest on \$4000 for 4 years, at 6% is \$960.00

The interest on \$240 for  $(3 + 2 + 1)$  years = 6 years is 86.40

\$1046.40

\$1134.96 - \$1046.40 = \$88.56, the interest on \$4000 for the number of months and days exceeding 4 years, plus the interest on four unpaid installments of annual interest for the same period; that is, on \$4000 + \$960 or \$4960. Interest on \$4960 at 6% for one year is \$297.60; to gain \$88.56 it would require  $\frac{88.56}{297.60}$  of a year, or 3 months, 17.13 days.

$\therefore$  \$4000 would amount to \$5134.96, at 6% annual interest in 4 years, 3 months, 17.13 days.

Also solved by G. B. M. ZERR, and P. S. BERG.

98. Proposed by J. SCHEFFER, A. M., Hagerstown, Md.

A poor man borrowed \$20 which he repaid in eleven monthly installments of \$2 each; what was the annual rate of interest (reckoned as simple interest)?

Solution by HON. JOSIAH H. DRUMMOND, LL. D., Portland, Me.

The last installment would be paid in eleven months, which, therefore, would be the time the \$20 would be on interest, and the interest would be  $\frac{1}{12} \times 20 \times \text{rate}$ . The first installment would be on interest 10 months, and the interest on the installments would be  $\frac{5}{12} \times 2 \times \text{rate}$ . Then  $\frac{2}{12}$  times the rate less  $\frac{1}{12}$  times the rate would be \$2, or \$2 is  $\frac{1}{12}$  times the rate. Hence the rate is  $24\frac{1}{11}\%$ .

Also solved by WALTER H. DRANE.

[NOTE. P. S. Berg solved problem 95, but his solution reached us too late for credit in last issue. Problem 99, should read, "How many cats will catch 100 rats in 100 minutes?" Ed. F.]